NORTH CAROLINA
MUSEUM OF HISTORY

History Happens Here

Moccasins to Motorcars

Distance Learning Program

Teacher Supplement

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Program Overview

Moccasins to Motorcars is a hands-on program that explores the five periods of transportation in North Carolina. Through time line activities, students will use critical-thinking skills to examine the effects of transportation on North Carolinians and their environment.

The **Postprogram Materials** include information on North Carolina's history of transportation, articles from *Tar Heel Junior Historian* magazine, a railroad schedule, other information, and five related activities. These materials will encourage students to think about the history of transportation and its impact on the lives of North Carolinians.

Postprogram Activities

The distance learning program ***Moccasins to Motorcars*** is designed to engage students in thinking about transportation, its history, and its impact on the lives of North Carolinians. We hope that you will enrich your students' understanding of this topic by incorporating some of the suggested follow-up activities into your classroom lessons.

These activities include several articles from *Tar Heel Junior Historian* magazine. If you would like to receive free issues of future magazines, form a Tar Heel Junior Historian Association club in your school. To receive a membership application, please call Jessica Pratt at 919-807-7985, e-mail thjhaclubs@ncdcr.gov, or visit the museum's Web site at http://www.ncmuseumofhistory.org/thjha/index.html.

1. Supplement your students' knowledge of the history of each period of the timeline used in the Distance Learning program. See if they can recall at least two characteristics of each period (pages 5–6).

2. After the students have read "Those Big Wheels Just Keep On Turnin': Transportation" (pages 7–10), have them work in groups to complete the corresponding work sheet (page 11).

3. Use the Train Fare Sheet, Train Schedule Sheet, and Rail Line Map (page 13–17) for the following activities:

    a. Use the Train Fare Sheet (page 13) for math applications. Have students use a certain dollar amount to plan a trip on Amtrak. Use the fare sheet for computations.

    b. Plan a trip to visit the North Carolina Museum of History in Raleigh from the train station nearest your school, based on the Train Schedule Sheet (page 14) and the Rail Line Map (page 15). Where and when would you board? When would you return? What cities would you pass through on the way to Raleigh?

    c. Have students work in groups to improve the existing train system. Your community should have access to a rail station, but the train route must also be efficient. Students should justify their improvements.

4. Copy the article "Our Moving Economy: Transportation and Technology" (pages 16–17). Divide the class into three sections. Give each section an age to cover (water, steam, or gasoline). Each section, divided into pairs, should research and illustrate the time period, economy, and transportation. The sections can present their time period to the class or create a time line wall display.

5. After reading "North Carolina Transportation: A Chronology of Invention and Technology" (pages 18–21), highlight a few of the 48 events for your students. These events can be presented as daily transportation trivia.

Postprogram Materials: Time Line Information Sheet

Time Period #1
Seasonal Motion, 500 BC–AD 1585

In 500 BC American Indian tribes in North Carolina practiced agricultural techniques that enabled them to limit their migration and establish more permanent homes. This interval in North Carolina history is known as the Woodland period. It refers not to a specific tribe or language group but to the practices and customs of most Indian tribes in North Carolina

Woodland tribes obtained food by hunting, fishing, farming, and gathering. The major game animal was deer. When Indian men hunted game, they carried at least one pair of moccasins for foot protection. Hunting required that they cover a large area on foot.

While only men in the tribe hunted, women often participated in fishing. Coastal tribes frequently spearfished from dugout canoes at night, building small fires on wet sand in the canoes to attract fish, then spearing them as they neared the boats. Tribes living near rivers or streams also used canoes to travel longer distances in order to trade with other tribes or European settlers.

Remember: American Indians did not use carts, wagons, horses, or farm animals for transportation. These forms of travel were introduced by Europeans.

Time Period #2
New Ways to Move, 1585–1770
European settlers brought goods that they traded to Indian tribes, often demanding an outrageous exchange. But to Indians, who came to depend on these goods, the costly trade may have seemed advantageous.

Guns and ammunition replaced bows and arrows, and most Indians preferred metal knives and hatchets to stone tools, trading corn, handicrafts, deer skins and war captives (slaves). The European settlers' demand for skins was insatiable; as a consequence, the deer population declined. Therefore, tribal hunters had to travel farther from their villages to find the deer needed to satisfy the demand for deer skins.

North Carolina's treacherous coast was known as the "Graveyard of the Atlantic." Despite the danger, many commercial vessels came through North Carolina's ports at Brunswick, Roanoke, Beaufort, Bath, and Currituck during the colonial period. North Carolina's ports were important channels of commerce, even though none was as large or as accessible as Charleston or Boston.

Small boats could carry a lot of cargo for their size. Numerous commodities came through North Carolina's ports during the colonial period. North Carolina received finished manufactured goods from Great Britain. From the West Indies came rum, molasses, sugar, salt, coffee, and chocolate. North Carolina also did business with the northern colonies, selling naval stores (tar, pitch, and turpentine), food products (pork, corn, peas, flour, hams, and cheese), lumber, and deer skins.

Although there were many roads in colonial North Carolina, their quality was very poor. People traveled by horse or, when transporting goods, by cart or wagon. The wealthy traveled by sulky, gig, chariot, or coach. But traveling was difficult, and people did so only to transport goods or to move permanently. The problem of getting goods from the backcountry to eastern North Carolina markets and ports improved with the arrival of the railroad.

Time Period #3
Stuck in the Mud, 1770–1830
In the early 1800s North Carolina trailed the rest of the nation in agriculture, transportation, manufacturing, and education, earning a reputation as the "Rip van Winkle State." (Rip van Winkle, in the story by Washington Irving, fell asleep for 20 years.) North Carolina fell behind because eastern planters (who had developed markets for their crops in Virginia and South Carolina) controlled the state legislature and voted down all measures to make improvements. Better roads, canals to transport agricultural products and other goods, and better navigation of the state's rivers and shallow sounds would have benefited all North Carolinians. People in the Piedmont and western areas of the state had particular difficulty getting their goods to market because the rivers were not completely navigable and the roads were extremely poor. Many North Carolinians left the state and moved west during this period because of the slow pace of change and the difficulty in making a living.

Time Period #4
Roads of Wood and Steel, 1830–1900
Plank roads, briefly popular in the 1850s, were an improvement over dirt roads. In plank road construction, the roadbed was first graded, then opened for travel so that it could settle before the planks were laid. The center of the roadbed was elevated, and drainage ditches were dug on each side. Four wood sills were imbedded to support the planks. After the planks were laid, they were covered with sand.

Plank roads were very expensive not only to construct but also to maintain because the wood rotted very easily in wet and muddy conditions. Plank roads in North Carolina were built mostly with private funds. Before using plank roads, travelers had to pay a toll.

The steam locomotive and the development of railroads helped to bring North Carolina out of the Rip van Winkle period of its history. State funding of railroad construction reflected the legislature's new commitment to improving transportation. The railroad allowed farmers in the Piedmont to increase their crop production because they could now send their surplus to market more efficiently and cheaply.

Time Period #5
Taking Off, 1900–1945
The early to mid-twentieth century was marked by the introduction and development of new modes of transportation. The early 1900s witnessed the development of the first horseless carriage in the state. However, the first automobiles were too expensive for all but the very wealthy. By 1919 mass production of the Ford Model T allowed many more Tar Heels to take to the road.

In the 1920s motor vehicles brought many changes to people, especially to those in rural areas. People were able to bypass high-priced country stores and drive to less expensive stores in town. Country doctors made their rounds faster, and patients got to hospitals more quickly. School buses transported students in rural areas to school. Furthermore, the rise of automobiles created new businesses, such as automobile dealerships, gas stations, and automobile repair shops.

The aviation age arrived in North Carolina in 1903. Brothers Orville and Wilbur Wright, bicycle makers from Dayton, Ohio, became interested in flight. The Wright brothers flew their motor-driven glider three times on December 17, 1903, at Kitty Hawk on the Outer Banks. Raleigh, Charlotte, and Greensboro built municipal airports in 1920s. By 1946 air travel began to boom.

Those big wheels just keep on turnin': transportation

by Allen W. Trelease

Transportation in colonial America was chiefly by water. In North Carolina that was easiest along the coast and on the coastal plain where rivers and streams were slow, wide and deep, and easy to navigate. Farther inland in the piedmont they were shallower and full of rocks and rapids, making transportation of goods difficult. Although early piedmont settlers sometimes shipped products by rafts or flatboats, settlers mostly depended on roads.

The first roads were Indian trading paths. People traveled on them by foot. Some of the trails were very long. When colonists moved into the piedmont—the backcountry—they used these trails. They added to them and widened them for wheeled vehicles, such as carts and wagons for carrying their belongings. Later, stagecoaches were used for carrying passengers and mail. But without paving or adequate drainage, most of the roads quickly became muddy, rutted tracks. They were in such poor condition that people often drove in the woods alongside the roads in search of firmer ground. Bridges were few and far between, and streams were crossed at **fords**—naturally shallow places. On roads like these, vehicles bogged down, broke down, tipped over, and occasionally were swept away by floods.

Under these conditions, which lasted from the mid-1700s to the mid-1800s, piedmont residents were isolated. Travel was so slow, expensive, and dangerous that most people never went far from home. Farmers raised few crops for sale because it cost more than the crops were worth to take them to market.

The early 1800s brought a transportation revolution to the United States. Improved roads—or turnpikes—plank roads, canals, steamboats, and railroads made transportation faster and cheaper, if not always safer. In the 1850s the revolution reached piedmont North Carolina in the form of **plank roads** and railroads. A plank road consisted of long, wooden beams placed lengthwise on either side of the roadway. These were then topped with thick, wooden planks placed crosswise. Covered with a layer of sand, gravel, or dirt, the plank road made a fairly smooth and speedy road for horse-drawn vehicles. Plank roads were built by private companies who charged a toll for their use. Several were built in North Carolina. The longest and most successful was the Fayetteville and Western, which extended from Fayetteville to Salem (now Winston-Salem, Forsyth County) and included what later became Main Street in High Point, Guilford County. Plank roads were an improvement over the

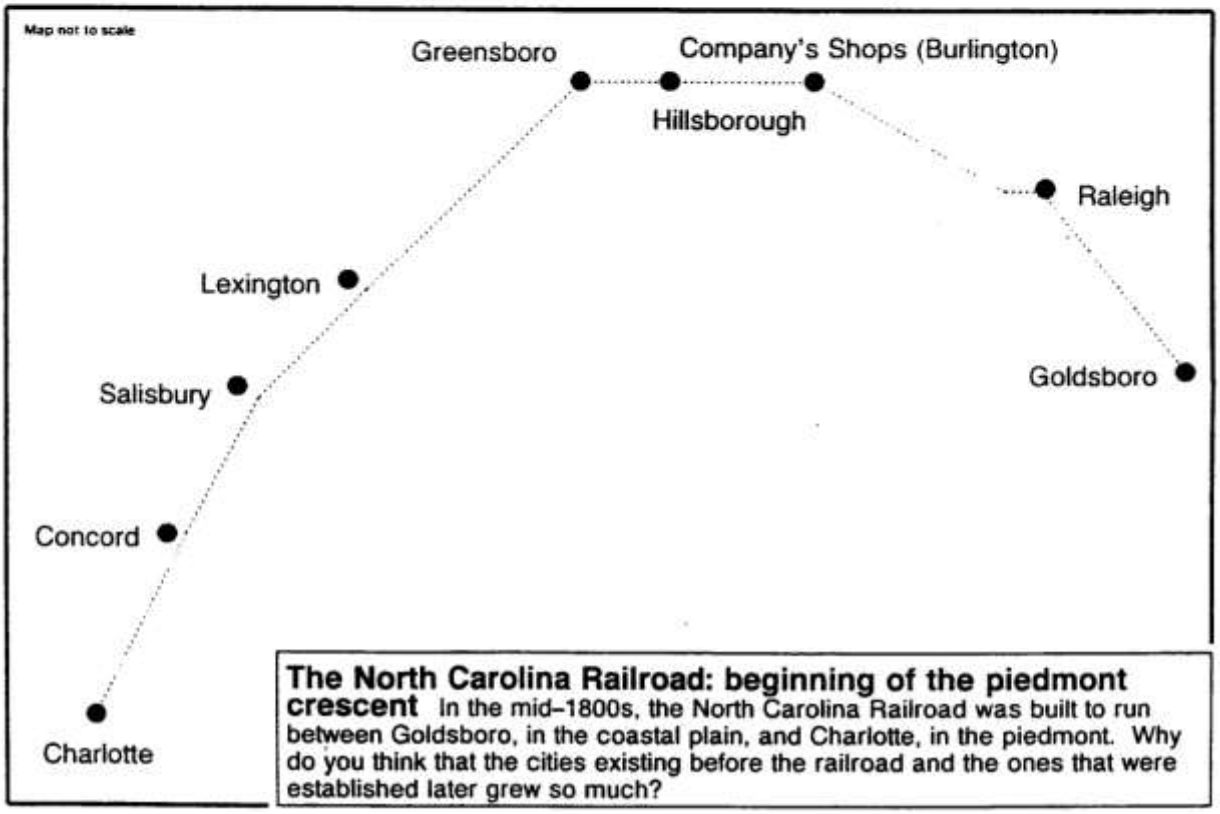
mud tracks that they replaced, but they were subject to decay and repair every few years.

The real revolution came with the "iron horse"—the railroad. Railroads were expensive to build and moderately expensive to maintain. But they were capable of sending passenger and freight at unheard-of speeds, exceeding twenty-five miles per hour sometimes, over long distances without having to stop overnight. North Carolina's first railroads—the Wilmington and Raleigh Railroad and the Raleigh and Gaston Railroad—were completed in eastern North Carolina in 1840.

Rails came to the piedmont in 1856 with the North Carolina Railroad. It linked the coastal plain town of Goldsboro with the piedmont towns of Raleigh, Hillsborough, Greensboro, Salisbury, and Charlotte. By the early 1900s, other rail lines connected Charlotte with Wilmington; Salisbury with Asheville and other mountain towns; Fayetteville with Greensboro, Winston-Salem, and towns north; and Raleigh with places in South Carolina and beyond. Following a national pattern, these short lines were soon **consolidated**—or joined—into regional and national systems, like the Southern Railway. The consolidation movement has continued through the 1900s, including the 1983 merger of the already large Norfolk and Western and Southern railways into the still larger Norfolk Southern.

Railroads ended the piedmont's isolation by bringing it closer to the rest of the world. They stimulated urbanization and economic growth by encouraging commercial farming, trade, and manufacturing. (To learn more about urbanization, see David R. Goldfield's article, "Cities Rising from the Fields," in this issue.) The cities and towns of the piedmont—and the textile, tobacco, and furniture industries within them—grew because of the railroads.

As railroads took over more and more of the long-distance transportation, wagon roads often fell into even worse repair than before. But roads improved dramatically after 1900 with the introduction of the internal combustion engine, powering automobiles, trucks, and buses. People bought these vehicles, and they demanded better roads for them. And as the roads improved, the number of vehicles increased, leading to demands for still better roads. Long distance travel became easier in the 1920s



The North Carolina Railroad: beginning of the piedmont crescent In the mid-1800s, the North Carolina Railroad was built to run between Goldsboro, in the coastal plain, and Charlotte, in the piedmont. Why do you think that the cities existing before the railroad and the ones that were established later grew so much?

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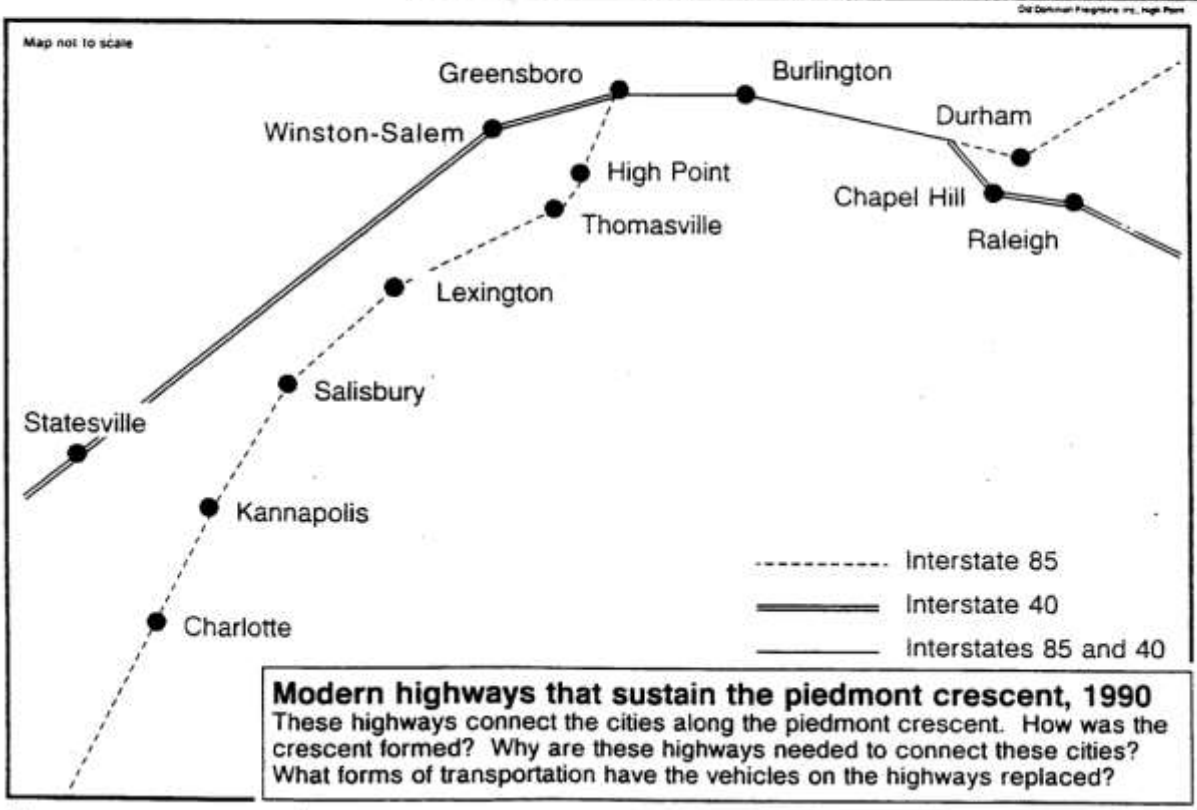
Why are these men hauling freight by wagons pulled by horses instead of hauling freight by trucks (Above, left)*? What kind of road are they traveling on? This man and his family have a problem* (Above, right)*. How will they get out of it? Poor roads like this were common in the piedmont from the colonial days until the 1930s. The state began replacing dirt roads with hard-surfaced roads because so many people needed better roads for cars, trucks, and buses. Now people drive or ride in cars, trucks, and buses on two- or four-lane highways with concrete or asphalt surfaces* (Right).

Old Dominion Freightline, Inc., High Point



Modern highways that sustain the piedmont crescent, 1990
These highways connect the cities along the piedmont crescent. How was the crescent formed? Why are these highways needed to connect these cities? What forms of transportation have the vehicles on the highways replaced?

14

Many peoply rely on the airplane to get to distant cities. These are early versions of airliners and airports. What do they look like today? Why do some people today rely on an airplane instead of a car, bus, truck, or train? Did you know that Piedmont Airlines, now owned by USAir, was founded in North Carolina?

when bus and truck lines developed, along with greater use of the automobile.

Local roads were now incorporated into statewide and national networks. Federal Highway Acts of 1916 and 1921 created the system of United States numbered highways, eventually including U.S. 1, U.S. 29, U.S. 64, U.S. 70, and others in North Carolina. In 1956 another law established the interstate highway system, including I-40, I-77, and I-85. On the main roads at least, dirt and gravel gave way to concrete and blacktop. Two-lane roads with sharp curves and steep hills gave way to four-lane, limited access superhighways with broad curves, gentle grades, and high speed limits. By 1960, for its population and area, North Carolina had more miles of paved roads than any other state. Over ninety-six percent of its people lived within one mile of a paved road.

All of this came about in competition with yet another form of transportation, the airplane. Like the automobile, bus, and truck, the airplane got its start around 1900. Today, airlines carry only a tiny proportion of the nation's freight, but they have come to dominate the long-distance passenger business. Piedmont North Carolina, with most of the state's population, claims its largest airports at Charlotte, Raleigh-Durham, and Greensboro–Winston-Salem–High Point. The first two now boast direct flights to Europe.

The automobile, airplane, and bus have captured most of the passenger business today. Since World War II, railroads have gotten most of their income from hauling freight. Some of this is carried in cooperation with truck lines. Loaded truck trailers are carried long distances on railway flatcars and are pulled to their final destination by truck. Railroad passenger service has almost disappeared. It is restricted to one long-distance Norfolk Southern train running through the region in the middle of the night.

Industries today locate in piedmont North Carolina and elsewhere with an eye to highways, airports, and railroads. They depend on these facilities not only to send and receive goods but to communicate with other regions and even to get their employees to work. As the roads improve, more and more factories and businesses locate close to them, often in open country, drawing workers from farther and farther away. This situation is a far cry from the days when Indian trading paths carried Indians, explorers, and settlers through this region's isolated backcountry. ■

Postprogram Materials:
"Those Big Wheels Just Keep On Turnin'" Work Sheet

1. What conditions in early Piedmont history caused residents to be isolated?

2. Draw a picture of a plank road.

3. Evaluate the changes in transportation in North Carolina by completing the following chart:

Instrument	Benefits	Problems
Plank Road		
Railroad		
Car, truck, bus		
Airplane		

Postprogram Materials:
"Those Big Wheels Just Keep On Turnin" Work Sheet Answer Key

1. *Few navigable rivers, poor roads, and lack of bridges.*

2. *Answers may vary.*

3. *Complete chart below:*

Instrument	Benefits	Problems
Plank Road	*Plank roads had a firm surface and they provided easier travel than dirt roads; plank roads were also cheaper than railroads.*	*Plank roads were not durable; they needed frequent repairs; slow vehicles were used on them.*
Railroad	*Railroads were faster and quicker; they were more dependable; they linked the state's towns and cities with farms; and they ended the Piedmont's isolation.*	*Railroads were expensive to build and maintain.*
Car, truck, bus	*Cars, trucks, and buses provided greater mobility cheaply to a large number of people.*	*The first vehicles required roads, which were sometimes unavailable; as more and more vehicles were put into use, they created pollution; high speeds increased death.*
Airplane	*Airplanes shortened travel times drastically.*	*Airplane travel was expensive; it was not available to everyone.*

Postprogram Materials: Train Fare Sheet

Passenger Train Fares in North Carolina

Contact your travel agent or Amtrak at 1-800-USA-RAIL.

FARES	Wilson	Selma	Raleigh	Cary	Durham	Burlington	Greensboro	High Point	Salisbury	Kannapolis	Charlotte	*Cary is served by The Piedmont only.
Rocky Mount	$9	$14	$22	*	$23	$25	$33	$35	$38	$44	$50	One-way
	$14	22	30		30	32	40	42	46	52	$58	Round-trip
Wilson		$11	17	*	18	22	26	32	35	42	45	One-way
		$18	24		26	30	34	40	42	50	52	Round-trip
Selma			$10	*	11	18	22	25	33	36	38	One-way
			$16		18	26	30	32	40	42	46	Round-trip
Raleigh				$6	7	10	13	17	25	29	31	One-way
				$9	10	16	20	24	32	36	38	Round-trip
Cary					$6	9	12	16	24	28	30	One-way
					$9	14	18	24	32	36	38	Round-trip
Durham						$7	11	16	22	26	29	One-way
						$12	18	24	32	36	38	Round-trip
Burlington							$7	9	18	20	23	One-way
							$12	14	28	30	36	Round-trip
Greensboro								$5	11	13	17	One-way
								$8	18	20	26	Round-trip
High Point									$8	11	15	One-way
									$12	18	24	Round-trip
Salisbury										$5	10	One-way
										$8	16	Round-trip
Kannapolis											$7	One-way
											$12	Round-trip

All fares are standard adult coach (seat) class rail charges.
See reverse side for special discounts and current information.

Postprogram Materials: Train Schedule Sheet

TAKE THE TRAIN.

THE PIEDMONT
RALEIGH • GREENSBORO • CHARLOTTE

SCHEDULE

Raleigh	departs	7:10 a.m.	Charlotte	departs	5:30 p.m.
Cary	departs	7:23 a.m.	Kannapolis	departs	5:57 p.m.
Durham	departs	7:46 a.m.	Salisbury	departs	6:16 p.m.
Burlington	departs	8:30 a.m.	High Point	departs	6:52 p.m.
Greensboro	departs	9:06 a.m.	Greensboro	departs	7:07 p.m.
High Point	departs	9:20 a.m.	Burlington	departs	7:43 p.m.
Salisbury	departs	9:57 a.m.	Durham	departs	8:25 p.m.
Kannapolis	departs	10:14 a.m.	Cary	departs	8:48 p.m.
Charlotte	arrives	10:55 a.m.	Raleigh	arrives	9:15 p.m.

Schedules are subject to change.
Call your travel agent or Amtrak at 1-800-USA-RAIL. *Effective Jan. 15, 1996*

AMTRAK'S CAROLINIAN
CHARLOTTE • RALEIGH • NEW YORK

ABBREVIATED SCHEDULE

NORTHBOUND TRAIN			*SOUTHBOUND TRAIN*		
Charlotte	departs	8:00 a.m.	New York	departs	6:20 a.m.
Kannapolis	departs	8:27 a.m.	Philadelphia	departs	8:05 a.m.
Salisbury	departs	8:45 a.m.	Washington	departs	10:45 a.m.
High Point	departs	9:23 a.m.	Richmond	departs	1:10 p.m.
Winston-Salem	departs	8:35 a.m.	Rocky Mount	departs	3:07 p.m.
Greensboro	departs	9:41 a.m.	Wilson	departs	3:25 p.m.
Burlington	departs	10:19 a.m.	Selma	departs	3:50 p.m.
Durham	departs	11:05 a.m.	Raleigh	departs	4:47 p.m.
Raleigh	departs	11:55 a.m.	Durham	departs	5:25 p.m.
Selma	departs	12:34 p.m.	Burlington	departs	6:09 p.m.
Wilson	departs	1:00 p.m.	Greensboro	departs	6:57 p.m.
Rocky Mount	arrives	1:17 p.m.	Winston-Salem	arrives	8:05 p.m.
Richmond	arrives	3:30 p.m.	High Point	departs	7:11 p.m.
Washington	arrives	5:45 p.m.	Salisbury	departs	7:50 p.m.
Philadelphia	arrives	8:14 p.m.	Kannapolis	departs	8:07 p.m.
New York	arrives	9:56 p.m.	Charlotte	arrives	8:45 p.m.

Schedules are subject to change.
Call your travel agent or Amtrak at 1-800-USA-RAIL. *Effective Jan. 15, 1995*
The Carolinian makes additional stops in Virginia, Maryland, Delaware and New Jersey.

DISCOUNTED FARES
- Senior citizen (age 62+) discounts (15% off lowest fare) are available seven days a week.
- Accompanied children under 2 ride free; Children age 2-15 ride half price.
- Active duty military receive 25% discount.

BOARDING ASSISTANCE
- The following stations are accessible to disabled passengers: Rocky Mount, Raleigh, Cary, Burlington, Greensboro, High Point, Salisbury and Charlotte.
- Call **1-800-USA-RAIL** 24 hours in advance to make special arrangements for boarding assistance.

TICKET INFORMATION
- For tickets and information, please call your travel agent, **1-800-USA-RAIL** or call the local Amtrak stations at the numbers listed below:

Selma	(919) 965-9900
Rocky Mount	(919) 446-3646
Raleigh	(919) 833-7594
Greensboro	(910) 855-3382
High Point	(910) 841-7245
Charlotte	(704) 376-4416

- *The Piedmont* does not require advance reservations.
- Tickets may be purchased on the train, however a $7 surcharge may be levied if a full-service ticket office was open at your point of departure.

Winston-Salem Service
CAROLINIAN CONNECTOR

The *Carolinian Connector* is a daily Thruway Van Service for ticketed Amtrak passengers connecting Winston-Salem to the Greensboro Amtrak station to meet the *Carolinian* for points north.

Departing Salem Inn 8:35 a.m.
Arriving Salem Inn 8:05 p.m.
Salem Inn, 127 South Cherry Street
Carolinian Connector service.

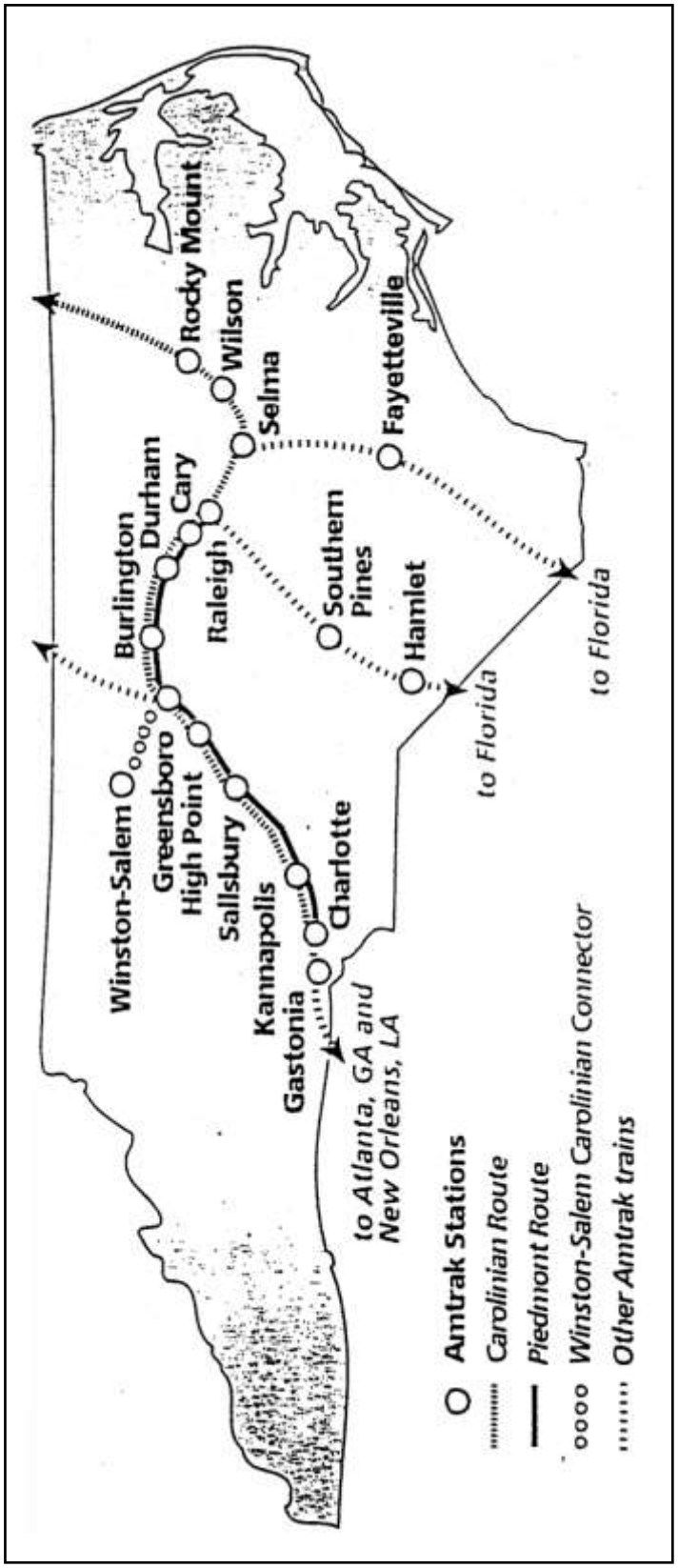
(Currently, the Thruway Van Service to Winston-Salem does not extend to meet the Piedmont.)

AMTRAK®

1-800-USA-RAIL
(1-800-872-7245)

North Carolina Department of Transportation
Rail Division
P.O. Box 25201, Raleigh, NC 27611-5201

Postprogram Materials: Rail Line Map



The earliest ways of traveling were on land by foot and over water in some kind of craft. Water was probably the more important because larger amounts of goods could be moved with less effort. Ports along the coast could be reached by traveling the sounds, and interior towns, at least as far as the fall line, could be reached by river.

Our moving economy: Transportation and technology

by Robert E. Ireland

Imagine how different life would be if there had never been technological improvements in transportation.

Think what it would be like if no trucks traveled the highways day and night to provide fresh food, clothing, fuel, furniture, and practically everything else that is sold in retail stores. We would have no cars to travel to and from work in, to vacation in, to go shopping in.

In fact, without modern transportation the economy of North Carolina would be limited to small farms and communities where most people would produce goods only for their own use. You would have almost no physical contact with anyone more than a few miles away. If you relied on written news, you would have a general lack of awareness about the rest of the state, nation, and world because newspapers and magazines would take days, weeks, even months to arrive.

Can you see how transportation has always been a very important factor in the growth and development of North Carolina's economy?

Definitions

*The **fall line**, or fall zone, is an imaginary line that connects the locations on rivers where you would first encounter waterfalls as you travel inland. Above the fall line, rivers are more difficult to navigate.*

*In North Carolina, **interior** places are inland, away from the coast.*

The age of water transport

During the colonial period, people and goods arrived at and departed from port cities along the coast. From these port cities, North Carolina was connected with the other colonies and with England, the West Indies, and the rest of the world.

Rivers also connected the Coastal Plain with **interior** locations. Interior towns were often settled along rivers at the **fall line.** Rivers served as the chief means of transporting raw materials, such as timber, livestock, naval stores, and supplies, between these towns and ports at the coast.

Unfortunately many of the colony's rivers were not navigable above the fall line, so people and goods were often transferred from water to land to get farther inland or from land to water to reach the coast. Still, since the few roads in the colony were often impassable throughout the muddy months of March, April, May, and sometimes June, even inland rivers were used as much as possible.

But the use of rivers for transporting goods and people had its limits. Some waterways became too shallow during long dry periods or too dangerous at flood stage. The most serious limitation of water travel was the location of a stream or river, sometimes far from the raw materials that needed to be shipped or the destinations that needed them.

The apparent answer to this problem was to build a series of canals to connect riverways with each other and with towns that were not river ports. Canals were also

As settlers began moving above the fall line and into the backcountry Piedmont, land travel became more necessary. But dirt and clay roads were often muddy and impassable during much of the year. Many types of road-building technologies, like plank roads and macadamizing (placing a layer of tar between three or more layers of increasingly larger stone), were used over the years. This log road and bridge near New Bern, Craven County, are other examples of road technology. Logs were cheaper and less valuable to thieves (who sometimes "acquired" planks from roads to use on the sides of their houses) than plank roads but were still an improvement over mud and clay.

more reliable during droughts and floods because water levels could be raised and lowered by systems of gates and locks. A number of canals were built in North Carolina in the 1830s. However, other advances in transportation technology were soon to replace the canal as the most effective means of shipping goods to market.

The age of steam transport

In 1818, steam-powered paddle wheelers began operating on the open waters of Pamlico and Albemarle Sounds to provide transportation between New Bern and Elizabeth City. Soon after, steam-powered riverboats were quickly and reliably transporting cargo upriver without the expense of building or maintaining a canal.

Steam-powered land travel was also arriving in North Carolina. Steam-powered railroad engines could haul heavy loads for long distances to locations, practically anywhere, where tracks could be laid. The first major railroad in North Carolina was the Wilmington and Weldon line, completed in 1840.

After the Civil War (1861–1865), North Carolina continued to see the expansion of rail service. Lines into the western mountains opened the area to new industries like tourism and the harvesting of natural resources such as timber and minerals. Eventually, the difficulty of carrying goods and resources to railroad lines began to plague producers. It was at this point, in the late 1890s, that another technological development occurred that solved that problem.

The internal combustion gasoline engine was invented in Europe and adapted in the United States by Henry Ford for use in "horseless carriages."

The age of gasoline transport

Improvements in the technology of transportation have always been closely related to the use of newly developed fuel sources. During the period from 1790 to 1990, for example, the fuel needed to provide transportation changed from grain (for horses and mules), to wood (for steam), then coal (also for steam), and finally petroleum (for gasoline and diesel engines).

The gasoline engine was only one of three competing systems used to power the earliest horseless carriages. Steam engines, which by then had long been used in locomotives and ships, were slow to start, since a fire had to be built to heat water in a boiler and create steam. Electric cars suffered from a frequent need to recharge their batteries, which seriously limited their range of travel. Thus, the gasoline engine won out over its two older competitors because it provided the most power for the longest distance. By the 1920s, gasoline engines were powering not only automobiles but also buses, trucks, tractors, and airplanes.

A revolution in transportation and how we live occurred because of the gasoline engine. More and more people began traveling. Recognizing the potential of the motor vehicle, North Carolina responded in the 1920s by constructing a massive network of paved roads and bridges that would span the state. In the years since, interstate highways and huge airports have been built to allow even faster means of travel.

Now, too, it was possible to start new businesses on the outskirts of a city and to build single-family houses in areas within automobile traveling range. These areas were called suburbs. As people ventured farther from cities, it also became advantageous to create shopping centers and malls outside the city. Today we are seeing cars take people farther away from cities to more rural areas we call exurbs.

What do you think the growth of exurbs will mean to our future? Do you see further changes in lifestyles or traditions?

As a youth in Maine, Robert E. Ireland spent hours drawing cars, jets, and baseball players before becoming interested in history. After moving to North Carolina in 1986, he wrote a book, Entering the Auto Age, *and became a college history professor. He is now a teacher and counselor at Wake Technical Community College in Raleigh.*

The river scene photograph is provided courtesy of the Travel and Tourism Division of the North Carolina Department of Commerce. All other artwork is from the North Carolina Division of Archives and History.

In the early 1900s road-building projects like the Carteret County Million Dollar Road Program helped spread hard-surfaced roads across the state. Ironically, steam-powered equipment like this steamroller (above) and animal-powered equipment like this grader (left) were often used to build roads for their replacements—gasoline-powered vehicles.

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Postprogram Materials:
"North Carolina Transportation: A Chronology of Invention and Technology"

1584: The first English explorers sail from Plymouth, England, for North America. After a journey of a little over two months, their two ships will arrive along the coast of what will become North Carolina.

1740s: Scotch-Irish and German settlers are traveling down the Great Philadelphia Wagon Road to North Carolina's Piedmont. Much of the road was originally a trading path used by American Indians.

1781: Benjamin Heron's drawbridge over the Northeast Cape Fear River near Castle Hayne is burned by British troops. Built around 1768, it is one of only a few drawbridges in the colonies.

1790: Dismal Swamp Canal is chartered to connect Albemarle Sound with the Chesapeake Bay.

1793: Construction on the Dismal Swamp Canal begins. Pieces of today's Intracoastal Waterway system follow part of the path of this early transportation route.

1818: The *Prometheus* is the first steamboat built in North Carolina.

1818: The Neuse River Navigation Company operates a steamboat between Elizabeth City and New Bern. Robert Fulton, on the Hudson River in New York, had begun operating the first successful commercial steamboat only eleven years earlier.

1819: Archibald DeBow Murphey presents a formal report on internal state improvements to the General Assembly. Among his recommendations are deepening inlets through the Outer Banks to increase foreign trade with North Carolina ports, building canals to connect those coastal ports with major Piedmont rivers, clearing those rivers to make them more navigable and to increase trade with towns along them, and improving roads to link those towns and allow trade to grow farther inland.

1827: Completion of the Buncombe Turnpike starts an economic boom to the Mountain region of North Carolina. Mountain farmers can now get their produce to markets outside the region, and tourists can now travel to the mountains by wagon, carriage, or stagecoach rather than on foot or horseback.

1828: An experimental, or horse-drawn, railway in Fayetteville carries freight from the Cape Fear River to warehouses on Bridge and Person Streets.

1833: A horse-drawn, or experimental, railway is laid to move stone from quarries to the site of the new capitol in Raleigh. The first true railroad in the state also is completed. It connects Petersburg, Virginia, with Blakely, a town near Weldon on the Roanoke River.

1840: After seven years of fund-raising, arguing, and building, the Wilmington and Weldon Railroad is completed. Originally slated to terminate in Raleigh, the northern end has been moved to Weldon, which is already a railroad town, when Raleigh shows no interest. Once finished, the 161½-mile track is the longest route under one charter in the world. The Raleigh and Gaston Railroad also opens in 1840.

1849–1856: The North Carolina Railroad opens in sections between Goldsboro and Charlotte. Riders are excited at the great speed of the trains—about 14½ miles per hour! Towns along this transportation corridor will soon lead the state in population growth and industrial development. The area will become known as the Piedmont Crescent.

1854: A plank road connecting Fayetteville with Bethania, near Salem, is completed. At 129 miles, the Fayetteville and Western Plank Road is the longest plank road in the world.

1856: Work on the Albemarle and Chesapeake Canal begins. Eventually, this canal will become a section of the Intracoastal Waterway.

1859: Cape Lookout Lighthouse is built to make shipping traffic along the coast safer.

1874: Stagecoach service to Charlotte is discontinued. Travelers now use trains, which cover much of the state with nearly 3,100 miles of track.

1887: Electricity has proven itself in Charlotte now that electric lights have been installed. Within five years, electric-powered streetcars will even replace the horse-drawn service that started earlier this year.

1888: Jerome Bolick, a buggy manufacturer in Conover, obtains four patents for a steel buggy wheel made with steel spokes. Advertisements brag that his "steel spokes [can be] replaced in five minutes using a monkey wrench"—much better than waiting for a wheelwright to disassemble an entire wooden wheel, carve a spoke to fit, and then reassemble—a process that takes at least a couple of hours. Interestingly, most of Bolick's sales are to the North, where he buys his steel.

1889: North Carolina's first electric streetcars begin service in Asheville.

1902: The North Carolina Good Roads Association is organized to promote a network of all-weather roads that will connect every county seat and all state institutions not in a county seat with each other. Harriet Morehead Berry of Hillsborough is instrumental in publicizing the plan and securing legislative support.

1902: The first automobile is registered in Charlotte.

December 17, 1903: Wilbur and Orville Wright accomplish one of humankind's greatest feats by flying the first mechanically powered, controllable, heavier-than-air craft. On the first successful flight, Orville reaches a height of about 10 feet for 12 seconds and travels 120 feet in the winds of Kill Devil Hills near Kitty Hawk.

1905: John B. Rumbaugh of Asheville is the first person to drive a car from Asheville to New York City. The trip takes him 14 days! In 1911 he will become the first to drive across the Appalachian Mountains into Tennessee.

1907: Paul Cornu maintains the first flight of a true helicopter at five feet above ground for 20 seconds.

1908: The Clinchfield Rail Road between Marion, North Carolina, and Erwin, Tennessee, is completed. With some of the steepest and curviest sections of track in the eastern United States, it is considered one of the greatest engineering feats since the Saluda Grade in 1878.

1912: Coy Richardson, a farmer and mechanic in Alleghany County, produces a vehicle capable of navigating his muddy fields near Sparta.

July 4, 1912: Fourth of July festivities in Gastonia feature an "aeorplane" [sic]. Three thousand people crowd onto a new electric railway line between Charlotte and Gastonia to see it, while 110 automobiles carry other observers to the celebration.

1914: The new Mount Mitchell Railroad opens North Carolina's secluded Black Mountains to logging and tourism.

1919: Dillon Supply Company builds a self-propelled mechanical cotton picker for Loomis MacGoodwin of Raleigh. It is one of the first field machines to pose a serious threat to human labor.

1921: Intensive lobbying by Harriet Morehead Berry leads to passage of a law creating North Carolina's modern state highway system.

1923: Military officials sail to a site off Cape Hatteras for a demonstration of the potential of aerial bombing. General Billy Mitchell supports his argument for increasing the use of airplanes in warfare by destroying two retired navy ships in less than thirty minutes.

1925: Mrs. W. J. Matherly of Chapel Hill invents what is possibly the first automobile seat belt and child-restraint device. She places broad bands of cloth under her 11-month-old daughter's arms and across her chest. Then she adjusts the bands so they are tight enough to hold the child captive yet loose enough for her to move her head and limbs.

1927: The Ford Motor Company manufactures 100,000 automobiles at a plant in Charlotte.

1927: Charles Lindbergh wins a prize of $25,000 for flying nonstop from New York to Paris, a 33-hour flight over water. He returns to the United States by ship and is welcomed by four million people and a ticker-tape parade in New York City.

1931: Raleigh becomes a rest and refueling stop on the first regularly scheduled airline passenger route from New York to Miami.

1935: German engineers begin developing early prototypes of jet engines. A poor decision by Adolf Hitler slows Germany's introduction of jet aircraft into World War II until after 1944.

1936: The Intracoastal Waterway is completed through North Carolina.

1937: The German airship *Hindenburg* bursts into flames in New Jersey after arriving from Frankfurt, Germany.

1940: Piedmont Aviation is incorporated under North Carolina law. The airline company is headquartered at Smith Reynolds Airport in Winston-Salem.

1944: During World War II, Major George E. Preddy of Greensboro gains international fame as a flying ace by shooting down a record number of Nazi aircraft.

1948: North Carolinian Francis Melvin Rogallo invents the triangular-winged delta plane for hang gliding.

1949: The General Assembly authorizes $7,500,000 in bonds to improve the shipping ports at Wilmington and Morehead City.

1949–1953: More than 14,800 miles of rural roads are finally paved in Governor W. Kerr Scott's campaign to "get the farmer out of the mud."

1950–1953: While they were first used in World War II (1941–1945), helicopters become indispensable during the Korean War. When medics begin serving on helicopter crews and giving blood transfusions in flight, the number of wounded soldiers who die before reaching hospitals drops in half.

1954–1958: The Boeing 707 (1954) and the McDonnell Douglas DC-8 (1955) are introduced to the public. Together, these two planes change the world's travel mode from ships and trains to

airplanes. By 1958, more than one million passengers fly across the Atlantic Ocean—the first time more people fly across than cross on steamships.

1962: Clarence "Kelly" Johnson unveils the SR-71 Blackbird, which is capable of reaching Mach 3.3 (3.3 times faster than the speed of sound) at 90,000 feet. Among its speed records is a flight from Los Angeles to Washington, D.C.—in only 64 minutes!

1970: The Boeing 747 enters service with seating for up to 550 passengers. New wing designs and construction materials are pioneered for this aircraft, which takes an acre of space just to park in.

1979: Van Morgan, a high school senior from West Forsyth, is recognized by the Westinghouse Science Talent Search for inventing a car safety device he calls "USCAN," an "ultrasonic collision anticipator." Morgan's device emits silent sound waves from a box mounted on a car's front bumper. The waves bounce back from the rear bumper of a similarly equipped car ahead. The distance between bumpers is measured by a computer. The computer also calculates the speeds of both cars, the driver's reaction time, and any effects of weather conditions before warning the driver if he is following too closely.

Postprogram Materials:
Transportation-Related Historic Sites and Museums in North Carolina

Bunker Hill Covered Bridge
Claremont, NC
828-465-0383
http://www.catawbahistory.org/bunker_hill_covered_bridge.php

Great Smoky Mountains Railroad Train Museum
Dillsboro, NC
800-872-4681
http://www.gsmr.com

National Railroad Museum and Hall of Fame
Hamlet, NC
http://www.micropublishing.com/railroad/

North Carolina Transportation Museum
Spencer, NC
877-628-6386
http://www.nctrans.org/

Roanoke Island Festival Park
Manteo, NC
252-475-1500
http://www.roanokeisland.com/

Wilmington Railroad Museum
Wilmington, NC
910-763-2634
http://www.wrrm.org

Wright Brothers National Memorial
Kill Devil Hills, NC
252-441-7430
http://www.nps.gov/wrbr/

Contact Information

We hope that you have enjoyed taking part in this distance learning program. We invite your comments and questions. Please take advantage of other distance learning programs offered by the North Carolina Museum of History, including History-in-a-Box kits, videos on demand, educator notebooks, and the Tar Heel Junior Historian Association, as well as professional development opportunities for educators. For more information, visit http://www.ncmuseumofhistory.org/edu/Classroom.html.

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Division of State History Museums • Office of Archives and History
North Carolina Department of Cultural Resources, www.ncculture.com

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